WHAT IS CLAIMED IS:

1. An apparatus for monitoring an optical signal-to-noise ratio, comprising:

an orthogonal polarization component module for receiving an optical signal and outputting it after removing a signal component thereof at a specific frequency band; and

calculation means for measuring both average optical intensity and electrical noise component intensity of the optical signal outputted from the orthogonal polarization component module.

2. The apparatus according to claim 1, wherein the orthogonal polarization component module includes:

a polarization controller for receiving the optical signal and outputting it while controlling first and second polarization components of the optical signal perpendicular to each other to have the same intensity;

a polarization divider for receiving the optical signal outputted from the polarization controller, and dividing it into the first and second polarization components, and then outputting them;

an optical delay element for receiving one of the first and second polarization components outputted from the polarization divider, and delaying and outputting the received

polarization component; and

a polarization combiner for receiving the two polarization components outputted from the polarization divider, one being delayed by the optical delay element and the other not delayed, and combining them into an optical signal and outputting the optical signal.

3. The apparatus according to claim 2, wherein the amount of delay to be made through the optical delay element is calculated by the following equation:

$$f = 1/(2\Delta\tau),$$

where "f" denotes the specific frequency and "$\Delta\tau$" denotes the amount of optical delay.

4. The apparatus according to claim 1 or 2, wherein the calculation means includes:

an optical divider for dividing the optical signal outputted from the orthogonal polarization component module into two optical signals in two different directions;

average signal intensity measurement means for measuring a average signal intensity of one of the two optical signals outputted from the optical divider;

noise intensity measurement means for measuring a noise intensity of the other one of the two optical signals outputted from the optical divider; and

a calculator for calculating an optical signal-to-noise ratio based on both the measured average signal intensity and the measured noise intensity.

5. The apparatus according to claim 4, wherein the average signal intensity measurement means includes:

a first optical detector for receiving said one of the two optical signals outputted from the optical divider and converting it into a first electrical signal, and outputting the first electrical signal; and

a DC amplifier for amplifying a DC component of the first electrical signal outputted from the first optical detector.

6. The apparatus according to claim 4, wherein the noise intensity measurement means includes:

a second optical detector for receiving said other one of the two optical signals outputted from the optical divider, and converting it into a second electrical signal and outputting the second electrical signal;

an AC amplifier for amplifying an AC component of the second electrical signal outputted from the second optical detector, and then outputting the amplified AC component;

an electrical band pass filter for extracting a noise component from the AC component amplified by the AC amplifier, and outputting the extracted noise component; and

an electrical intensity meter for measuring an intensity of the noise component outputted from the electrical band pass filter.

7. The apparatus according to claim 1 or 2, wherein the calculation means includes:

an optical detector for receiving the optical signal outputted from the orthogonal polarization component module and converting it into an electrical signal, and outputting the electrical signal;

an electrical intensity divider for dividing the electrical signal outputted from the optical detector into two electrical signals to be outputted in two different directions;

average signal intensity measurement means for receiving one of the two electrical signals outputted from the electrical intensity divider, and measuring a average signal intensity of the optical signal;

noise intensity measurement means for receiving the other one of the two electrical signals outputted from the electrical intensity divider, and measuring a noise component intensity; and

a calculator for calculating an optical signal-to-noise ratio based on both the measured average signal intensity and the measured noise component intensity.

8. The apparatus according to claim 7, wherein the average signal intensity measurement means includes a DC amplifier for amplifying a DC component of said one of the two electrical signals outputted from the electrical intensity divider,

the noise intensity measurement means includes:

an AC amplifier for amplifying an AC component of said other one of the two electrical signals outputted from the electrical intensity divider;

an electrical band pass filter for extracting a noise component from the AC component amplified by the AC amplifier; and

an electrical intensity meter for measuring an intensity of the noise component outputted from the electrical band pass filter.

9. The apparatus according to claim 2, wherein the optical delay element is tunable.